

Five-Year Review Report

Second Five-Year Review Report for Saltville Waste Disposal Ponds Superfund Site Saltville, Virginia

September 2002

**United States Environmental Protection Agency
Region III
Philadelphia, Pennsylvania**

Approved by:

Date:

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List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DDA	Demolition Debris Area
EPA	U.S. Environmental Protection Agency
FCPS	Former Chlorine Plant Site
FS	Feasibility Study
HDPE	High Density Polyethylene
LLDPE	Linear Low Density Polyethylene
NCP	National Contingency Plan
NPL	National Priorities List
NFHR	North Fork Holston River
OU1	Operable Unit One
OU2	Operable Unit Two
OU3	Operable Unit Three
OU4	Operable Unit Four
O&M	Operation and Maintenance
µg/L	Micrograms per Liter
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SCLP	Saltville Community Liaison Panel
USACE	U.S. Army Corps of Engineers
VDEQ	Virginia Department of Environmental Quality
VPDES	Virginia Pollution Discharge Elimination System

Executive Summary

The remedy for the Saltville Waste Disposal Ponds Site in Saltville, Virginia included diverting clean storm water around the waste ponds, capping the de-watered waste ponds, treating leachate, institutional controls, and monitoring. The Site is being addressed in operable units. The first three operable units (“OUs”) have been constructed and are operational and functional. A Remedial Investigation and Feasibility Study for the final OU is underway. The first five-year review for this Site was completed in September 1997.

The assessment of this, the second five-year review found that the remedy was constructed in accordance with the cumulative requirements of the two Records of Decision (“RODs”). The risks presented by the waste disposal ponds have been addressed and the selected remedy is currently protective, however institutional controls must be put in place for the remedy to be protective in the long-term.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: Saltville Waste Disposal Ponds		
EPA ID: VAD003127578		
Region: 3	State: Virginia	City: Saltville
SITE STATUS		
NPL status: Final		
Remediation status: OU1 and OU2 completed; OU3 under construction; OU4 RI/FS underway		
Multiple Operable Units (OUs)? Yes		
Has site been put into reuse? Yes, the remediated waste ponds are functioning as wildlife habit area.		
REVIEW STATUS		
Lead agency: EPA		
Author name: Eric Newman		
Author title: Remedial Project Manager	Author Affiliation: U.S. EPA, Region 3	
Review period: 7/2002 - 9/2002		
Date of site inspection: 7/11/2002		
Type of review: Post SARA		
Review number: 2 (second)		
Triggering action: First Five-Year Review completed 9/30/97		
Triggering action date: 9/30/97		
Due date: 9/30/02		

Five-Year Review Summary Form, cont'd.

Issues:

- ! Deed restrictions must be placed on Ponds 5 and 6 to prevent development of the property or the installation of drinking water wells.
- ! OU4 RI/FS focusing on FCPS and NFHR needs to be completed to quantify risk to human health and the environment. The fact that the OU4 RI/FS has not been completed does not call into question whether the remedy selected in ROD-1 and ROD-2 is protective; however, EPA is not yet in position to state whether the Site is protective.

Recommendations and Follow-up Actions:

- ! EPA needs to work with Olin to finalize language for deed notice. Olin needs to file the notice with appropriate authorities.
- ! Olin needs to complete the ongoing OU4 RI/FS; EPA to issue ROD-3.

Protectiveness Statement:

- ! The remedy at OU1 is protective of human health and the environment. This interim remedial action was selected to reduce the volume of clean storm water entering Pond 5, a contaminated area, thereby reducing the quantity of contaminated leachate. The remedial action objective has been met.
- ! The remedy at OU2 is protective of human health and the environment as exposure pathways that could result in unacceptable risks are being controlled. The water treatment plant that was constructed to treat mercury-contaminated leachate exiting Pond 5 has consistently met its performance standards.
- ! The remedy at OU3 currently protects human health and the environment because the engineering controls have been completed in a manner that: prevents direct contact with process wastes; further limits the quantity of storm water coming into contact with the process wastes, thereby reducing the volume of contaminated leachate which needs to be treated prior to discharge to the NFHR. Further, Pond 6 leachate is now conveyed to the water treatment plant for pH adjustment prior to discharge to the NFHR. The water treatment plant effluent meets water quality performance standards which are protective of human health and the environment. However, in order for the remedy to be protective in the long-term, the institutional controls restricting development of Ponds 5 and 6 and restricting installation of potable wells on the property must be put in place.

Other Comments: None

Saltville Waste Disposal Ponds Superfund Site
Saltville, Virginia
Second Five-Year Review Report
EPA ID No. VAD003127578

I. INTRODUCTION

The purpose of a five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The Agency is preparing this Five-Year Review report pursuant to CERCLA §121 and the National Contingency Plan (“NCP”). CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action.

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The U.S. Environmental Protection Agency (“EPA”), Region 3, conducted this five-year review of the remedy being implemented at the Saltville Waste Disposal Ponds Superfund Site (“Saltville” or “Site”) in Saltville, Virginia. This review was conducted by the Remedial Project Manager of the Site between July 2002 and September 2002. This report documents the results of the review.

This is the second five-year review for the Saltville Site. The triggering action for this statutory review is the completion of the first five-year review in September 1997. The five-year review is required because the remedy allows mercury and high pH waste material to remain on-Site at levels which do not allow for unlimited use and unrestricted exposure.

II. SITE CHRONOLOGY

TABLE 1 - CHRONOLOGY OF SITE EVENTS

Date	Activity
1895-1972	Olin Corporation or its predecessors (Olin Mathieson Chemical Corporation, Mathieson Chemical Corporation and Mathieson Alkali Works) operated various chemical manufacturing operations in Saltville.
1950-1972	Olin Corp or its predecessors operated a mercury cell chlor-alkali plant on the bank of the North Fork Holston River. Facility demolished in June 1973.
November 1982	Olin entered into a Consent Special Order with the Virginia State Water Control Board wherein Olin agreed to remove mercury contaminated sediment from River, encapsulate sediment on foundation of Former Chlorine Plant Site (FCPS) and cap with clay.
September 8, 1983	EPA promulgated the Site to the National Priorities List (NPL).
June 30, 1987	EPA issued first Record of Decision (ROD-1) requiring interim remedial measures and additional RI/FS.
September 15, 1988	Olin enters into Consent Decree wherein Olin agrees to implement ROD-1 selected remedy.
May 17, 1991	Olin completes Remedial Design for surface water diversion required by ROD-1 (defined as OU1 Remedial Action start in WasteLAN).
June 1991	Contractors mobilize to Site to begin OU1 construction
September 22, 1992	EPA approved report documenting that Olin completed OU1 Remedial Action
April 27, 1993	Olin completes Remedial Design for water treatment plant (defined as OU2 Remedial Action start in WasteLAN).
October 11, 1993	Contractors mobilize to Site to begin OU2 construction
July 8, 1994	Untreated discharge of Pond 5 leachate stopped; leachate diverted to equalization basin.
September 28, 1994	Water treatment plant passes proof-of-performance test and begins to treat Pond 5 leachate
September 29, 1995	EPA issued second ROD (ROD-2) requiring upgrade to the water treatment plant and engineering controls for waste disposal ponds. EPA defers decision on FCPS and North Fork Holston River pending additional studies.
September 3, 1996	EPA approved RA Report documenting that Olin completed construction of water treatment plant required by ROD-1 (defined as OU2 Remedial Action complete in WasteLAN).
July 29, 1997	Olin enters into Consent Decree wherein Olin agrees to implement ROD-2 selected remedy.
September 1997	EPA issues initial 5-Year Review
March 27, 2001	Olin completes Remedial Design for remedy selected in ROD-2: Pond 5 and 6 containment, shallow ground water diversion and more stringent leachate treatment (defined as OU3 Remedial Action start in WasteLAN).
April 2, 2001	Olin contractors mobilize to Site to begin OU3 construction
November 15, 2001	Pond 6 leachate pump house goes on-line and Pond 6 leachate permanently routed to water treatment plant.
July 11, 2002	Final inspection conducted for OU3 remedial action.

III. BACKGROUND

Surface Features

The Saltville Waste Disposal Ponds Superfund Site is part of Olin Corporation's former Saltville facility located along the north bank of the North Fork Holston River ("NFHR" or "river") between the towns of Saltville and Allison Gap, in western Smyth and eastern Washington Counties, Virginia (See Attachment 1). The river forms the southern border of the Site and Virginia State Route 611 runs along the northern border at the foot of Little Mountain. The Site consists of the Former Chlorine Plant Site ("FCPS") and two waste ponds, Ponds 5 and 6, and areas to which contamination has migrated, including the river. Pond 5 and its dikes cover an area of about 76 acres. Pond 6 is immediately west and downstream of Pond 5. Pond 6 and its dikes cover an area of about 45 acres. The Former Chlorine Plant Site is about one-half mile upstream of Pond 5 and has an area of about 4 acres.

Land and Resource Use

From approximately 1895 to 1972, the Saltville facility was owned and used by Olin Corporation ("Olin") or its predecessors (Olin Mathieson Chemical Corporation, Mathieson Chemical Corporation and Mathieson Alkali Works) as the location for various chemical manufacturing operations. Mathieson Chemical Corporation constructed a mercury cell chlor-alkali plant (also referred to as the chlorine plant) in 1950 and operated that plant until 1972.

The Olin facilities are located in the narrow mountain valley of the North Fork Holston River. The setting is rural with steep mountain slopes on either side of the river.

A human population study completed in 1994 identified three residential clusters in the vicinity of the Site. Approximately 40 residential dwellings are located to the south of Pond 5 and NFHR on Henrytown Road. To the northeast of Ponds 5 and 6, there are approximately 20 residential dwellings. The third area is on the northwestern side of Pond 5 on State Route 611 and has five homes.

Land use adjacent to the FCPS is industrial and consists of the Saltville Waste Water Treatment Plant to the north, a commercial dry ice plant to the northwest, a former settling pond to the west, a wheel manufacturing plant to the east across the NFHR, and a soil treatment and reclamation plant and auto repair/welding shop to the south across the NFHR.

Poor water quality stemming from the presence of evaporites including gypsum, potash, bittern and salt (hence the name Saltville) in the NFHR valley has kept upper aquifers in the vicinity from providing satisfactory water supply. Since the 1800's, Saltville and the local industry have relied on ground water sources in deep geologic units. These water sources consist of the Witt Spring located in Plasterco, the Cardwelltown Well (drilled in 1930) located north of Allison Gap and approximately one mile north of the FCPS, and from Palmer Springs and wells in the Broady Bottom area that are each over one mile east of the FCPS.

The Town of Saltville has an ordinance requiring residential and industrial developments to be on city water. Residences and adjacent industrial sites are supplied with city water. The city operates a 10-inch water main along State Road 634 adjacent the FCPS.

All areas comprising the Site, excepting the river itself, are currently fenced. At the FCPS, mercury-contaminated sediments are contained in an impermeable “envelope” which is covered with a clay and soil cap. Pond 5 is capped with a composite RCRA-type impermeable barrier. Pond 6 is covered with 18 inches of soil. The FCPS, Pond 5 and Pond 6 are capped or covered and vegetated to prevent erosion.

History of Contamination and Chemical Plant Operations

As mentioned above, Olin manufactured various chemicals on the Site from approximately 1895 to 1972, including the production of chlorine gas from 1950 through 1972. The chlorine plant produced chlorine gas and sodium hydroxide by passing brine, obtained by solution mining salt deposits in the area, between electrodes. The cathode used in this process was mercury and is considered the source of mercury in the pond wastes. The electrical current passing through the brine caused the formation of chlorine gas at the anode through electrolytic oxidation. At the same time a sodium amalgam was formed at the cathode. The amalgam was passed into a decomposing tower where the sodium was separated by flushing the water from the sodium hydroxide. Some of the mercury was lost in the production process and was solubilized and passed into Pond 5 in the wastewater.

Pond 5 was operated from approximately 1925 to 1971 and Pond 6 was put into service in 1964. The ponds were primarily used for the containment of ammonia soda ash wastes. In 1951, Pond 5 began receiving mercury-contaminated wastewater from the mercury cell chlor-alkali plant. The wastewater was discharged on the surface of Pond 5 near the eastern edge and directed around the northern perimeter by berms built on the surface of the pond. The process and washdown wastewater was conveyed to the eastern end of Pond 5 separately from the ammonia soda ash waste slurry. Pond 6 also shows evidence of receiving mercury-contaminated wastewater but not to the extent believed to be in Pond 5. The intent of the settling ponds was to allow wastewater to percolate into the pond solids and allow mercury to adsorb onto the fine, alkaline particles of the ammonia soda ash waste.

The dikes containing the ponds were constructed of rockfill cores (starter dikes) and built up with accumulations of slaker wastes. The slaker wastes were primarily composed of spent coke and roasted limestone waste. The Pond 5 dikes are approximately 100 feet high and the depth of settled solids varies from about 35 feet to 70 feet, with an average of about 63 feet. The Pond 6 dikes are approximately 35 feet high and the depth of the solids varies from about 20 feet to 30 feet. Until 1994, surface water discharge from Pond 5 was controlled by a decant structure located at the southwest corner of the pond which discharged directly to the river. Since 1994, discharge from Pond 5 has been routed through a water treatment plant for mercury abatement and pH adjustment prior to discharge. The structures have kept the water level in the ponds beneath the surface of the settled solids.

After Olin shut down the Saltville facility in 1972, Olin began demolition of the chlorine plant. Process mercury was removed from the equipment and shipped to Olin plants in Georgia and Alabama for re-use. The equipment was cleaned with wash water which was allowed to percolate into the soils at the Former Chlorine Plant Site. Some of the debris and obsolete equipment from the demolition of the plant was placed at the eastern edge of Pond 6. It was placed on the lower bench of the dike between Pond 5 and Pond 6 (referred to as the Demolition Debris Area or DDA). No sampling of the debris was conducted prior to disposal which was completed in June 1973. The debris was covered with locally-obtained soil.

Initial Response Activities

Environmental studies of the Site began in conjunction with heightened concern about mercury discharges nationwide. An investigation of the plant site and adjacent river by Olin, the Commonwealth of Virginia, and local agencies during the late 1960's revealed mercury contamination at the Site including in the river. In 1970, as a result of mercury concentrations found in fish, both Virginia and Tennessee placed a ban on fishing in the river. Both bans were later modified (Tennessee's in 1972, Virginia's in 1974) to permit fishing on a catch and release basis.

In 1978, a Task Force was formed which included the Virginia State Water Control Board, Virginia Attorney General's Office, Tennessee and Virginia State Departments of Health, Tennessee Valley Authority, and EPA. The Task Force required Olin to conduct studies to identify the sources of mercury contamination at the Saltville facility, and negotiated cleanup measures with Olin to reduce mercury input to the river.

Under a special order issued in 1982 by the Virginia State Water Control Board, Olin dredged contaminated sediments from a 1000 foot section of the river adjacent to the Former Chlorine Plant Site. The excavated sediments were placed on the Former Chlorine Plant Site. The contaminated sediments were segregated by size, with the fine fraction sealed in a 36-mil hypalon envelope and the larger sized sediments power-washed and placed near the hypalon envelope. The sediments were then covered with approximately 2 feet of clay and 6 inches of topsoil. This project was supplemented by the construction of a diversion ditch around the western, upstream side of Pond 5 (the Western Diversion Ditch) to reduce surface water flow onto the pond. The diversion ditch project captured surface water flowing from four natural swales (i.e., swales numbered 2-5) leading from Little Mountain and re-routed the clean water to the ditch which conveyed the water to the NFHR by gravity flow. At the time that this diversion ditch project was completed it was decided that a fifth natural swale ("swale 1") leading from Little Mountain on to the eastern end of Pond 5 could not be diverted due to lack of subsurface stability in the area.

Remedial Overview and Basis for Taking Action

EPA proposed the Saltville Waste Disposal Ponds Site for inclusion on the National Priorities List ("NPL") in December 1982, and placed the Site on the NPL on September 8, 1983, 48 Fed. Reg. 40658. In July 1986 and August 1986, EPA conducted a risk assessment and feasibility study ("FS"), respectively. These reports were based on existing data and available information supplied by the Saltville Task Force and Olin. EPA did not perform a remedial

investigation ("RI") at the time because of the significant amount of available data and continuing sampling effort being conducted under the 1982 special order between Olin and the Virginia State Water Control Board. EPA decided to conduct a risk assessment based on all available data to determine what data gaps existed. Several data gaps were identified in the 1986 risk assessment, however, it became clear that some initial steps could be taken to address obvious environmental problems at the Site. Accordingly, EPA determined that it was appropriate to address the Site in operable units ("OUs").

The first Record of Decision ("ROD-1"), issued in 1987, addresses the management of clean storm water flowing into Pond 5 from Little Mountain via swale 1 and the treatment of mercury-laden leachate released from Pond 5 prior to its discharge to the North Fork Holston River. The surface water diversion project and the construction of the treatment plant to handle leachate collected at Pond 5 were managed as standalone projects. Therefore, EPA identified the surface water diversion component of the selected remedy as Operable Unit 1 ("OU1"); the water treatment plant component was designated as Operable Unit 2 ("OU2"). Olin entered into a Consent Decree with EPA in 1988, wherein Olin agreed to implement the ROD-1 selected remedy and to conduct the additional RI/FS studies necessary to identify the remaining risks presented by the Site. In accordance with the consent decree, Olin completed the OU1 remedial action in 1991 and the OU2 remedial action in 1994.

The second ROD ("ROD-2"), issued in 1995, addresses waste disposal Pond 5 and Pond 6, and upgrading the OU1 water treatment plant to meet more stringent discharge standards for mercury abatement in Pond 5 leachate. ROD-2 also requires interception and diversion of an uncontaminated shallow ground water aquifer and neutralization of the Pond 6 discharge. This ROD was based on an RI/FS prepared by Olin. The process wastes contained in Ponds 5 and 6 exhibit pH of approximately 12; wastes in Pond 5 also contain high concentrations of mercury. The selected remedy includes: installation of a low permeability RCRA-Subtitle C cap to prevent direct contact with wastes and to reduce the volume of contaminated leachate from Pond 5; installation of a permeable soil cover over Pond 6 to prevent direct contact with high pH wastes; treatment of the combined flow of leachate from Ponds 5 and 6 to meet water quality standards in NFHR; and interception and diversion of shallow ground water flowing from Little Mountain into Pond 5. EPA has identified the work required by ROD-2 as Operable Unit 3 ("OU3"). Olin entered into a Consent Decree with EPA in 1997, wherein Olin agreed to implement the ROD-2 selected remedy. In accordance with the consent decree, Olin completed OU3 remedial action in September 2002.¹

Operable Unit 4 ("OU4") will address the Former Chlorine Plant Site (including ground water beneath that area) along with the impact of mercury contamination on the river. Olin is currently preparing the RI and FS for OU4, the final operable unit for the Site. A final ROD is scheduled for December 2003.

¹Final Inspection completed September 24, 2002, official completion date will be the date that EPA approves the OU3 Remedial Action Report.

IV. REMEDIAL ACTION

OU1 and OU2 Remedy Selection

On June 30, 1987, EPA issued ROD-1 selecting an interim remedy intended to take action to control migration of mercury from the Site. The selected remedy included the construction of a surface water diversion ditch/downchute around the eastern side of Pond 5, and construction and operation of a treatment plant to handle ground water/leachate collected at Pond 5. As stated above, ROD-1 was based on a risk assessment and feasibility study ("FS") conducted by EPA utilizing previously existing data. The major components of the selected remedy include:

- Upgradient controls to divert clean storm water flowing from Little Mountain around Pond 5 with ditches/berms/downchutes;
- On-Site treatment of Pond 5 outfall sufficient to achieve an in-stream concentration of 0.05 µg/L mercury in the NFHR;²
- Installation of ground water monitoring wells and conduct of a site-wide remedial investigation and feasibility study; and
- Operation and maintenance of the water treatment facility.

OU1 and OU2 Remedy Implementation

On September 15, 1988, EPA and Olin entered into a consent decree wherein Olin agreed to perform the remedial design/remedial action necessary to implement the remedy selected in ROD-1 and to pay the United States' past costs for responding to environmental problems at the Site. The surface water diversion project and the construction of the treatment plant to handle leachate collected at Pond 5 were managed as standalone projects. The remedial design for the surface water diversion project (OU1) was approved by EPA on May 17, 1991.

Olin contractors mobilized to the site in June, 1991 to begin remedial action in the field. The OU1 remedial action entailed capturing surface water flowing from swale #1 from the Little Mountain area north of Pond 5 and diverting that clean water around the wastes, thereby reducing the volume of contaminated leachate which needs to be treated in the OU2 water treatment plant. The major components of the OU1 remedial action were the following:

- High Density Polyethylene ("HDPE") liner and grout matting in collection basins upgradient of Pond 5;
- HDPE liner and grout matting in an open channel drainage ditch;
- Subsurface 42" HDPE pipe to convey clean water flowing from swale #1 across Pond 5; and

²It was determined that the treatment plant effluent must meet 20 µg/L mercury to achieve an in-stream concentration of 0.05 µg/L mercury in the NFHR.

- Discharge chute and stilling basin to control outfall to NFHR.

In addition to the bulleted ROD-1 requirements above, Olin upgraded the engineered diversion ditches for swales 2, 3, 4 and 5 which were constructed in 1982 to more efficiently convey that clean water from those swales to the western diversion ditch which discharges to the NFHR.

Construction in the field was completed and the contractor demobilized from the Site on November 11, 1991. On September 22, 1992 an OU1 Remedial Action Report was issued documenting the completion of the upgradient stormwater run-on controls.

The remedial design for the water treatment plant (OU2) was approved by EPA on April 27, 1993. Olin contractors mobilized to the site on October 11, 1993 to begin remedial action in the field. The major components of the OU2 remedial action were the following:

- Sump and pumping station to convey Pond 5 leachate to a 2,000,000 gallon equalization basin;
- Membrane-lined, 2,000,000 gallon equalization basin; and
- Water treatment plant which provides pH adjustment and carbon filtration for mercury abatement.

The activities for the OU2 remedial action were conducted by Olin's contractor as planned and EPA, VDEQ and CH2M Hill, EPA's oversight contractor, performed routine inspections throughout Olin's implementation of the OU2 remedial action. EPA and the State conducted an inspection on November 28, 1994. At the November 28, 1994 inspection, the carbon column effluent exhibited a pH below 8.0. In addition, mercury concentrations were well below 1.0 $\mu\text{g/L}$ ³; a calibration standard of 1.0 $\mu\text{g/L}$ prepared by Olin was used in the on-site laboratory. Olin began discharging treated effluent on November 28 when the effluent from the carbon columns had reached a pH of 7.5. Olin discharged water to the NFHR between November 28 and November 29, 1994 until the low-level cutoff was reached at the system pump station adjacent to the equalization basin. All monitoring demonstrated that the pH was between 6.0 and 9.0 and the mercury concentrations were below 1.0 $\mu\text{g/L}$ for the treated water discharged to the river. As a result of the inspection it was concluded that construction had been completed in accordance with the remedial design plans and specifications and did not result in the development of a punch list. On September 3, 1996 the OU2 Remedial Action Report documenting the completion of the OU2 remedial action was approved by EPA.

³ The 1.0 $\mu\text{g/L}$ mercury concentration that the effluent was meeting was 20 times lower than the ARAR set forth in ROD-1.

OU3 Remedy Selection

On September 29, 1995, EPA issued ROD-2, selecting a remedy which addresses the source materials (process wastes contained in Pond 5 and Pond 6) and the leachate exiting the Ponds. The major components of the selected remedy for Ponds 5 and 6, respectively, are listed below.

The selected remedy for the Pond 5 area consists of the following major components:

- Installation of a multi-layered cap over the entire Pond 5 area;
- Construction of an up-gradient ground water interceptor system;
- Revision of the effluent discharge limit for the existing Pond 5 Treatment Facility to achieve the current Virginia surface water standard for mercury⁴ and any modification of the Pond 5 Treatment Facility necessary to achieve the revised discharge limit⁵;
- Implementation of institutional controls;
- Site security and operation and maintenance (“O&M”) programs; and
- Long-term monitoring.

The selected remedy for Pond 6 and the contingent remedial action consists of the following components:

- A permeable soil cover over the entire Pond 6 area of approximately 40 to 45 acres, including the demolition debris burial area;
- A pH adjustment system to neutralize the discharge from the Pond 6 decant structure;
- Institutional controls;
- Maintenance of the Site security and maintenance programs; and
- Long-term monitoring, including installation of monitoring well(s) downgradient of the Demolition Debris Area.

⁴ The chronic water quality standard of 0.012 µg/L mercury for protection of aquatic life is the most stringent in-stream standard which must be met.

⁵ By letter dated November 22, 2000, VDEQ issued effluent limitations and operational procedures which meet ARARS. Treatment plant effluent must meet 3.6 µg/L mercury when river flow is higher than 160 cubic feet per second (cfs). If the river flow is lower than 160 cfs, a sliding scale which allows a decreased discharge rate from the plant must be followed.

The ROD stated that the following additional remedial action shall be required if mercury contamination from the buried debris is demonstrated to be migrating toward the river through the ground water in Pond 6:

- Isolation of Former Chlorine Plant Site demolition debris buried in the eastern end of Pond 6 by vertical barrier wall and a multi-layered cap over the two to three acres where the debris is buried.

OU3 Remedy Implementation

Olin is implementing ROD-2 in accordance with a consent decree entered in U.S. District Court on July 29, 1997. The OU3 remedial design for the selected remedy was approved by EPA on March 27, 2001. Olin contractors mobilized to the site on April 2, 2001 to begin remedial action in the field. The major components of OU3 remedial action, listed in approximate order of implementation, were the following:

- Installation of additional site security fence around Ponds 5 and 6;
- Construction of an 18-inch thick permeable soil cover over Pond 6 with slopes between one and four percent. The surface of the landfill was seeded with a diverse mix of grasses and grains to provide valuable wildlife habitat as beneficial reuse;
- Upgrades to Little Mountain swales 1-5 to intercept clean, shallow ground water and route augmented flow to rehabilitated western and eastern diversion ditches leading to NFHR;
- Closing Pond 6 outfall to eliminate discharge of high pH effluent to NFHR, retrofit stilling well (collection station) to accept effluent from Pond 6, installation of vertical turbine pumps to pump Pond 6 effluent from stilling well to the existing treatment plant, install new section of force main tied in to existing Pond 5 force main, pump Pond 6 effluent to treatment plant for pH adjustment to within range of 6 to 9;
- Construction of a multi-layered RCRA-Subtitle C compliant landfill cap with a profile (from bottom up) of 40-mil Linear Low Density Polyethylene ("LLDPE") geomembrane, a geosynthetic clay liner (in areas of less than two percent slope and drainage swales), a geocomposite drainage layer, and a 24-inch thick soil layer vegetated with diverse seed mix to provide wildlife habitat as beneficial reuse; and
- **Institutional controls have not yet been established.** Deed restrictions must be placed on Ponds 5 and 6 to prevent development of the property or the installation of drinking water wells on the property.

The activities for OU3 remedial action progressed in a manner consistent with ROD-2, and the EPA-approved Remedial Design and Remedial Action Work Plans. The Remedial Design Reports, including Quality Assurance Project Plans, incorporated all EPA and State quality assurance and quality control procedures and protocol. Olin developed and implemented construction and quality control plans in accordance with the Remedial Design specifications. EPA, VDEQ and USACE, EPA's field inspection and technical oversight professional, performed routine inspections throughout Olin's implementation of the OU3 remedial action. EPA and the State conducted a pre-final inspection on July 11, 2002 and developed a punch list of minor items yet to be completed. A final inspection was conducted on September 24, 2002 and confirmed that all significant items on the punch list had been satisfactorily addressed. Olin will submit the OU3 Remedial Action Report for EPA review and approval during the Fall of 2002.

In conformance with the consent decree, Olin has submitted draft deed restrictions for EPA approval. Olin's proposed draft language would apply to "...Washington County Tax Map and Parcel Number 014-A-32 and Smyth County Tax Map and Parcel Number 28A6-A-1 and will prohibit any type of activity that could disturb the surface or underlying waste, as well as the use of ground water from those areas as a source of potable water, or in any way increase the risk of exposure to contamination on the above-described property...." EPA expects to work with Olin to place the requisite deed restrictions in the near future. During the July 11, 2002 site inspection, no activities were observed that would have violated the institutional controls. The subject property is fenced. The newly completed cap on Pond 5 and cover on Pond 6 and surrounding areas were undisturbed, and no new uses of ground water were observed.

Long-Term Monitoring/Operation and Maintenance for OU1, OU2 and OU3

Olin submitted a detailed O&M plan for the water treatment plant as a component of the as-built package attached to the OU2 Remedial Action Report approved by EPA on September 3, 1996. Operational changes/limitations have more recently been put in place to ensure that the treatment plant continues to meet the revised discharge performance standard of 3.6 µg/L mercury and that the plant scales back the discharge rate if the NFHR flow rate is less than 160 cfs. As a practical matter, historic operations have documented that during periods of low flow in the NFHR leachate flow rate also decreases to the point that operation of the water treatment plant is unnecessary. During these low flow events, collected leachate is allowed to accumulate in the equalization basin. The water treatment plant O&M manual is currently being revised by Olin to include appropriate maintenance activities for the newly constructed Pond 6 pump station.

Olin is conducting long-term monitoring and operation and maintenance activities according to the O&M plan that was approved as Appendix M of the OU3 Remedial Design on March 27, 2001. The primary activities associated with long-term monitoring focus on the following areas:

- Ground water samples for mercury at the Ponds 5 and 6 dike wells and Demolition Debris Area trigger wells; and
- Monitoring of the Treatment Plant effluent for compliance with the Virginia State Water Control Law, Code of Virginia §§ 62.1-44.2 et seq., and the VPDES Regulations (VR 680-14-01).

The primary activities associated with O&M include the following:

- Visual inspection of the Pond 5 cap and Pond 6 cover with regard to vegetative cover, settlement, stability, and any need for corrective action. A mowing plan for Pond 5 is currently being developed which prevent colonization of woody plants with tap roots capable of damaging the geomembrane while also taking into account the intention to maintain a wildlife habitat. Pond 6 will have less stringent mowing requirements (i.e., there is no geomembrane to maintain) which will be supportive of the wildlife habitat end-use;
- Inspection of the swale interceptor system, Ponds 5 and 6 surface drainage system and eastern and western diversion ditches for blockage, erosion and instability and any need for corrective action;
- Inspection of dikes separating the Ponds from the NFHR for erosion and instability; and
- Inspection of site security fencing and condition of ground water monitoring wells.

Through September 2002, the primary O&M activities have been related to monitoring the effectiveness of the water treatment plant meeting surface water discharge standards. The water treatment plant has operated since 1994. The most recent Annual Operating Report for the water treatment plant for calendar year 2001 is attached (See Attachment 2). The treatment plant was operated on 105 days in 2001 during which approximately 23,000,000 gallons were discharged to the NFHR. This volume of water is near the annual average for the treatment plant. The daily monitoring documents that all water discharged achieved the 3.6 µg/L mercury and pH 6 to 9 performance standards. The average mercury concentration of the treated water was 0.8 µg/L. This is the second consecutive year that the average mercury concentrations of the treated effluent averaged less than 1.0 µg/L. Attachment 2 includes an operating summary documenting that the water treatment plant has met the mercury concentration performance standard each year since the plant began operations.

The OU3 remedial action was completed in the field in September 2002. The OU3 post-construction O&M and ground water monitoring plan will be finalized and implemented during the Spring of 2003.

V. PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

The first five-year review for the Site was completed in September 1997. The 1997 five-year review included a protectiveness statement concluding that the Site was not protective at that time. The report noted that implementation of the ROD-2 selected remedy had not yet been initiated and environmental investigations were anticipated focusing on the FCPS and the NFHR. Major achievements since the last five-year review:

- RCRA-Subtitle C impermeable cap has been constructed over Pond 5;
- Permeable soil cover has been constructed over Pond 6;
- Operational performance standards applied to the water treatment plant have been upgraded to achieve more stringent discharge standards;
- On-Site water treatment plant now provides treatment for Pond 6 leachate prior to its discharge to the NFHR.

The final inspection conducted on September 24, 2002 confirmed that the items bulleted above have been completed in the field. The OU3 selected remedy is operational and functional, achieving the respective performance standards. Maintenance and monitoring programs are being implemented. Institutional controls to prevent development of the Pond 5 and Pond 6 property are not yet in place.

VI. Five-Year Review Process

Administrative Components

EPA notified Olin, the Saltville Community Liaison Panel (“SCLP”) and state officials of the initiation of the five-year review in the Summer of 2002. The Saltville Five-Year Review team was led by Eric Newman, EPA’s Remedial Project Manager (“RPM”) for the Site, and included Patrick Gaughan, EPA’s Community Involvement Coordinator, and members from the Regional Technical Advisory staff with expertise in hydrology, biology and risk assessment. Tom Modena, Virginia Department of Environmental Quality assisted in the review.

The review team established the review schedule whose components included:

- Community Involvement;
- Document Review;
- Data Review;
- Site Inspection;
- Local Interviews; and
- Five-Year Review Report Development and Review.

The schedule extended from July 2002 through September 2002.

Community Involvement/Interviews

The Saltville Community Liaison Panel was established in 1996 and has been actively following the progression of the Superfund response at the Site on a continuous basis. The SCLP is comprised of 12-15 local citizens representing a cross-section of community leaders and interested folks which includes, but is not limited to, individuals from local government, law enforcement and emergency workers, public health and hospital workers, environmental activists, churches, high school students and former employees from Olin’s historic chemical operations. The SCLP is facilitated by a local community involvement firm retained by Olin and the meetings

are attended by current Olin employees, VDEQ, EPA and topic-specific experts as warranted. The panel meets locally every other month and the agenda features salient topics related to Site plans, current and future construction activities and environmental investigations. Panel members communicate on a daily basis with their respective friends, neighbors, and co-workers to inform them of information that they have learned at the SCLP meetings and, in turn, solicit questions and concerns that their peers may have about the Site. No questions or concerns are “out-of-bounds” at SCLP meetings. Accordingly, the EPA Five-Year Review Team decided that this pool of citizens represents a perfect pool of citizens to conduct interviews with to learn of any potential concerns that the local citizens may have about the Site.

During August and September of 2002, Eric Newman, EPA RPM, conducted interviews with several local citizens who are participating as members of the Saltville Community Liaison Panel and Olin employees who perform community out-reach to inform them that EPA was in the process of conducting a Five-Year Review at the Site and to solicit any concerns that they may have, or that may have been brought to their attention by others, about the protectiveness of the remedial actions being implemented.

On the afternoon of August 29, 2002, Mr. Newman was on-Site to conduct interviews with Keith Roberts, Olin’s Project Manager, and Stanley Haynes, Olin’s water treatment plant operator and liaison to the SCLP (Mr. Haynes is also a long-time resident of Saltville). Mr. Roberts and Mr. Haynes informed Mr. Newman that no negative concerns related to the protectiveness of the selected remedy have been raised to their attention.

With the Site being under active construction during 2001 and 2002, RPM Newman found that the local citizens were exceptionally well informed and that their understanding of Site conditions was current. With OU3 remedial actions nearing completion, the August 22, 2002 SCLP meeting was held in the construction trailer conference room on Site. The town of Saltville hosts an annual festival over the Labor Day weekend. The SCLP manned an information booth at the festival with before and after poster-sized pictures of the Site and a current site Fact Sheet informing the citizens of the status of activities. RPM Newman was on-Site on August 29, 2002 and stopped by to observe the booth and probe for Site-related citizen concerns. Site tours were provided to all comers on Labor Day with SCLP members functioning as the tour guides and Olin representatives available for technical backup. Approximately 70 citizens participated in Site tours.

During September 2002 RPM Newman followed up with telephone interviews with several SCLP members including Con Smith (local real estate agent), Jack Barbrow (local volunteer emergency services and photo-documentation for the SCLP), Benita Smith (retired school teacher) and Phil Collins to learn of any new questions or concerns that may have been raised during the Site tours. The findings were unanimous, Mr. Smith, Mr. Barbrow and Mr. Collins informed Mr. Newman that they have found that their fellow local citizens are comfortable with the response actions being taken to mitigate risks presented at the Saltville site to date. Community members are especially pleased by Olin’s decision to create a wildlife habitat on the freshly capped Ponds. During recent site visits several species of wildlife have been observed utilizing the surface of the remediated ponds including deer, fox, beaver and flocks of dove, quail and ducks. A pair of bald eagles have been regularly observed in trees adjacent the ponds (a recent photo of a bald eagle taken from the surface of Pond 5 was proudly displayed at the Labor Day festival). During Mr.

Newman's September 26, 2002, telephone interview with Ms. Smith, she stated that a bald eagle was at the Site at the time she was conducting tours at the Labor Day festival and that community members were able to observe the raptor through binoculars.

On September 24, 2002, Mr. Newman conducted a telephone interview with Mr. Phil Collins, a local citizen who works at the Mt. Rodgers Development group. Mr. Collins has participated on the SCLP for over five years and he is also the current President of Friends of the North Fork, a local angler and recreation club. Mr. Collins stated that he and other local residents have the same positive feelings about the work that has taken place out at the Site as was voiced by Mr. Smith, Mr. Barbrow, and Ms. Smith noted above but Mr. Collins also made the point that he and members of the club are eager for EPA and Olin to complete the ongoing RI/FS focusing on the NFHR. He and members of the club understand why there is a "fish but do not eat" fishing advisory on the river (i.e., due to elevated mercury concentrations in fish tissue) but that members of the club have great interest in actions being taken to remove the advisory. He and other club members strongly believe that the natural beauty of the North Fork Holston River Valley would be a strong draw to recreational fisherman/tourism but they feel that the fishing advisory has had a deleterious affect on the community's ability to attract these type of tourists.

The status of the ongoing RI/FS focusing on the FCPS and the NFHR is the lead topic planned for the October 2002 Saltville Community Liaison Panel meeting.

Document Review

This five-year review consisted of a review of relevant documents including O&M records and monitoring data. Applicable or relevant and appropriate requirements ("ARARs") identified in at Section 8.2 and Section 9.0 of ROD-2 were reviewed. The only major ROD-1 ARAR was the surface water discharge standard for mercury which was superceded by the more stringent ROD-2 ARARs.

The following documents were reviewed for this five-year review:

- ! Interim Record of Decision-1 (June 30, 1987)
- ! ROD-1 Remedial Design/Remedial Action Consent Decree (entered September 15, 1988)
- ! OU1 Milestone Report No. 6 – Construction Certification and As-Built Drawings for Eastern Diversion Ditch (dated March 4, 1992)
- ! Operation and Maintenance Manual for Water Treatment Plant (October 1994)
- ! OU2 Remedial Action Report for Water Treatment (approved September 3, 1996)
- ! OU3 Remedial Design Report (approved March 27, 2001)
- ! Draft Remedial Investigation for Former Chlorine Plant Site (August 2002)

- ! Monthly Progress Reports and Quarterly and Annual Monitoring Reports
- ! Record of Decision-2 (September 29, 1995)
- ! ROD-2 Remedial Design/Remedial Action Consent Decree (entered July 29, 1997)
- ! Saltville Waste Disposal Ponds First Five-Year Review Report (September 1997)

Data Review

The water treatment plant generates routine water quality monitoring data from plant influent and effluent. The water treatment plant only operates when enough water has accumulated in the equalization basin. The Five-Year Review Team reviewed the Quarterly and Annual Operation Reports. In accordance with the action-specific ARARs for the discharge, effluent at the “end of pipe” must meet 3.6 µg/L mercury and pH between 6 and 9. The water treatment plant has consistently met the performance standards for discharge to NFHR.

EPA also reviewed environmental data gathered during conduct of the on-going RI/FS to look for anomalies which may bring into question the site conceptual model. Surface water has been monitored on a weekly, monthly and quarterly basis for the last several years. The concentration of mercury in the NFHR has been demonstrated to meet the ARARs for surface water quality. The low concentration of mercury in the water column reinforces that the source control measures implemented at the Saltville Waste Disposal Ponds Site have been effective.

Site Inspection

On July 11, 2002, Eric Newman, EPA’s Remedial Project Manager for the Site, and Tom Modena, VDEQ’s State Project Officer for the Site, Randy Born, United States Army Corps of Engineers field inspector, and Olin representatives conducted a dual purpose Site inspection to conduct the pre-final inspection of the OU3 remedial action and contribute to the five-year review process. Follow up inspections were conducted by Eric Newman on August 29, 2002 and Randy Born on September 24, 2002. The five-year review objective of the inspection was to assess the protectiveness of the remedy, including the integrity of the Pond 5 cap and the Pond 6 cover, the Pond 5 and 6 leachate collection and conveyance system, and the operation of the water treatment plant. All components of the OU1, OU2 and OU3 remedial actions were confirmed operational and functional. No significant issues have been identified regarding the newly constructed Pond 5 cap, Pond 6 cover or operation of the water treatment plant.

Institutional controls included in ROD-2 have not yet been established. The ROD called for the placement of a deed restriction on Ponds 5 and 6 to prevent development of the property or the installation of drinking water wells on the property. No activities were observed that would have violated the institutional controls. The subject property is fenced, the cap and surrounding areas were undisturbed, and no new uses of ground water were observed.

VII. Technical Assessment

QUESTION A: IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

No, institutional controls have not yet been put in place.

The review of site-related documents, risk assumptions, and the results of the Site inspection indicates that the constructed remedy is functioning as intended by ROD-1 and ROD-2. The strategy of diverting clean stormwater and shallow ground water around the disposal ponds as well as capping the waste disposal ponds to shed rainfall has greatly reduced the volume of contaminated leachate which needs to be managed. The combined flow of leachate from Ponds 5 and 6 are conveyed to the on-Site water treatment plant. The performance standards for the water treatment plant are 3.6 µg/L mercury and pH between 6 and 9. The water treatment plant has consistently met the performance standards for discharge to NFHR.

The institutional control that ROD-2 required is the placement of deed notices on properties on Ponds 5 and 6 to prevent development of the property or the installation of drinking water wells on the property. Olin has submitted draft deed restriction language for EPA approval and EPA expects to complete discussions on the matter in the near future. During the July 11, 2002 site inspection, no activities were observed that would have violated the institutional controls. The subject property is fenced. The newly completed cap on Pond 5 and cover on Pond 6 and surrounding areas were undisturbed, and no new uses of ground water were observed.

QUESTION B: ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEANUP LEVELS, AND REMEDIAL ACTION OBJECTIVES (“RAOs”) USED AT THE TIME OF THE REMEDY SELECTION STILL VALID?

Yes.

Remedial Action Objectives

There have been no changes in the Site conditions that would affect RAOs or the overall protectiveness of the remedy. The work that has been accomplished has been designed and implemented to meet the RAOs.

Changes in Standards and To Be Considered (“TBCs”)

There have been no changes in ARARs or TBCs that affect the protectiveness of the remedy. The most important ARAR applies to the quality of the effluent discharged from the water treatment plant. Contaminated leachate from Ponds 5 and 6 is collected, treated, and discharged to the river in accordance with effluent limits and flow rates established by the VDEQ Water Division under the Virginia State Water Control Law, Code of Virginia §§ 62.1-44.2 *et seq.*, and the Virginia Pollutant Discharge Elimination System Regulations (VR 680-14-01). The existing effluent limit is in compliance with the current Virginia surface water standard for mercury.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

The exposure assumptions used to develop the risk assessment included child trespasser, child and adult resident and industrial worker. There have been no changes in the toxicity factors for mercury, the contaminant of concern, since the baseline risk assessment was completed. These assumptions are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No change to these assumptions, or the cleanup levels developed from them is warranted. The ROD-2 clean-up criteria continue to be protective of human health and the environment.

An OU4 RI/FS focusing on the FCPS and residual contamination in the NFHR is currently being performed. This on-going RI/FS includes human health and ecological risk assessments.

QUESTION C: HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?

No.

No other information has come to light that calls into question the protectiveness of the OU1 or OU2 remedies as constructed in conformance with ROD-1 or the OU3 remedy as constructed in conformance with ROD-2.

An OU4 RI/FS focusing on the FCPS and the NFHR is currently being performed. The on-going OU4 RI/FS will include human health and ecological risk assessments and provide the basis for a final ROD for the Site, to be designated ROD-3.

Technical Assessment Summary

According to the data reviewed, the site inspection, and the interviews, the remedy is functioning as intended by ROD-1 and ROD-2. There have been no changes in the physical conditions or the Site that would affect the protectiveness of the remedy. The ARARs for effluent discharge from the water treatment plant are being met. There has been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment, and there have been no change to the standardized risk assessment methodology that could affect the protectiveness of the selected remedy. EPA and Olin are finalizing the institutional controls language and implementation of the deed restrictions on Olin's property will be completed in the near future. There is no other information that calls into question the protectiveness of the selected remedy.

VIII. ISSUES

Table 2 - Issues

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Institutional Controls - Deed restrictions must be placed on Ponds 5 and 6 to prevent development of the property or the installation of drinking water wells.	N	Y
Complete OU4 RI/FS - OU4 RI/FS focusing on FCPS and NFHR needs to be completed to quantify risk to human health and the environment. The fact that the OU4 RI/FS has not been completed does not call into question whether the remedy selected in ROD-1 and ROD-2 is protective; however, EPA is not yet in position to state whether the <u>Site</u> is protective.	N	N

IX. Recommendations and Follow-Up Actions

Table 3 - Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
Institutional Controls	EPA to work with Olin to finalize language for deed notice. Olin to file notice with appropriate authorities.	Olin	EPA	9/30/2003	N	Y
Complete OU4 RI/FS	EPA to work with Olin to complete the ongoing OU4 RI/FS and issue ROD-3	Olin	EPA	12/31/2003	N	N

X. PROTECTIVENESS STATEMENT

The remedy at OU1 is protective of human health and the environment. This interim remedial action was selected to reduce the volume of clean storm water entering Pond 5, a contaminated area, thereby reducing the quantity of contaminated leachate. The remedial action objective has been met.

The remedy at OU2 is protective of human health and the environment as exposure pathways that could result in unacceptable risks are being controlled. The water treatment plant that was constructed to treat mercury-contaminated leachate exiting Pond 5 has consistently met its performance standards.

The remedy at OU3 currently protects human health and the environment because the engineering controls have been completed in a manner that: prevents direct contact with process wastes; further limits the quantity of storm water coming into contact with the process wastes, thereby reducing the volume of contaminated leachate which needs to be treated prior to discharge to the NFHR. Further, Pond 6 leachate is now conveyed to the water treatment plant for pH adjustment prior to discharge to the NFHR. The water treatment plant effluent meets water quality performance standards which are protective of human health and the environment. However, in order for the remedy to be protective in the long-term, the institutional controls restricting development of Ponds 5 and 6 and restricting installation of potable wells on the property must be put in place.

XI. NEXT REVIEW

The next five-year review for the Saltville Waste Disposal Ponds Superfund Site is required in September 2007, five years from the date of this review.

Attachment 1 - Site Map